

Docket No. 866.40842PX1
Serial No. 10/632,893
September 22, 2005

REMARKS

The present invention is an apparatus for treating a volume of fluid. An apparatus for treating a volume of fluid in accordance with an embodiment of the invention includes a fluid passage way 36 through which the fluid flows; at least one source of radiation 34, external to said fluid passage way; at least two reflecting troughs 22 and 24, each trough having a curved cross section, with a closed top end, top and bottom edges 22b and 24b, and an open end, the open end of each trough having first and second end edges 22c, 22d, 24c and 24d, the open end of the trough facing the open end of the second trough to define a space therebetween the space between the closed ends of the troughs, the top edges of the first and second trough defining a first plane, and the bottom edges of the first and second trough defining a second plane; a first set of reflectors 26 and 28 joining the end edges of the first trough to the edges of the second trough, each reflector of the first set of reflectors having a top edge lying substantially in the first plane and a bottom edge lying substantially in the second plane; and a second set of reflectors 30 joining the top edges of the troughs and of the first set of reflectors and joining the bottom edges of the troughs and of the first set of reflectors, the second set of reflectors cooperating with the troughs and the first set of reflectors to define a substantially closed chamber having the at least one source of radiation therein and having the fluid passageway passing therethrough, wherein; each source of radiation is within a respective one of the troughs, and at least one of the fluid passageway and the at least one source of irradiation is spaced from all focal axes of the troughs so as to provide a substantially uniform irradiation distribution within the fluid passageway. The present invention provides an improvement of treating flowing fluids as described in paragraph [0003] of the specification.

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Claims 1-79 are rejected under the judicially created doctrine of obviousness type double patenting as being unpatentable over claims 1-75 of U.S. Patent No. 6,614,026. The Examiner states that "[a]lthough the conflicting claims are not identical, they are not patentably distinct from each other because it is obvious to one of ordinary skill in the art that all the limitations in Claims 1-79 of Application No. 10632893 are contained in Claims 1-75 of U.S. Patent No. 6,614,028." Submitted herewith is a Terminal Disclaimer which overcomes the double patenting rejection.

Claims 1-4, 11-22, 27-29, 35, 40-42 and 69-79 stand rejected under 35 USC §103 as being unpatentable over U.S. Patent No. 6,590,217 (Freeman et al.) in view of U.S. Patent No. 6,626,561 (Carter). The Examiner reasons as follows:

Freeman (217) discloses a UV sterilization unit having a tubular shaped irradiation chamber formed of plural reflectors 192 and plural tubular shaped lamps 140A and 140B, aligned longitudinally such that all UV energy is focused on the fluid in passageway 112, as recited in claims 1-4, 11-17, 19, 20, 27, 72 and 74-79. See Column 2, lines 65-67; Column 3, lines 1-14; Column 6, lines 15-27; and Figure 5.

Freeman (217) as applied above fails to teach placing the lamp in a position spaced apart from the focal axes of the troughs to provide a uniform irradiation distribution, as recited in claims 1, 18, 21, 22, 28, 29, 69-71, and 73. However, Carter (561) teaches defocusing the lamp within the reflector chamber to provide more uniformity of irradiation of irradiation at the surface of the sample. See Column 3, lines 3-9; Column 4, lines 11-20 and Figure 4 below.

Therefore, it would have been obvious to one of ordinary skill in the art that the UV sterilization apparatus and method of Freeman (217) can be modified to use the source defocusin method of Carter (561), to provide a lamp spaced from the first focal point of the elliptical reflector, thereby providing a more uniformly irradiated sample surface.

These grounds of rejection are traversed for the following reasons.

The Examiner correctly recognizes the deficiencies of Freeman et al. which clearly teach in the diagram in Figure 5 that the treatment of fluid is provided by focusing light from light sources 140A and 140B into the center of the fluid chamber 114. Therefore, uniform irradiation distribution is not provided to the fluid flowing

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therein. As stated above, with respect to paragraph [0003] of the specification, the Applicant's invention is directed to providing uniform irradiation of the fluid flowing through fluid passageways with ultraviolet light to provide disinfection, purification or oxidation of the fluid with areas. This overcomes the problem of the flowing fluid not receiving uniform irradiation resulting in potentially undertreated fluid and fluid in the vicinity of center peak irradiation receiving higher doses of irradiation which could cause damage to material therein.

Rejected claim 1 recites inter alia that "at least one of said fluid passageway and said at least one source of radiation is spaced from all focal axes of said troughs so as to provide a substantially irradiation distribution within the fluid in said fluid passageway." Freeman et al., as acknowledged by the Examiner, operates on a principle differing from claim 1 in which the fluid flowing within fluid chamber 114 from the outside circumference toward the center 166 receives an increasing intensity of irradiation with a maximum at center point 166. Therefore, Freeman et al.'s operation would not achieve the objective as set forth in the claims and as stated above as being important in the fluid treatment to avoid damage to the material being treated.

The Examiner's reliance upon Carter to motivate a person of ordinary skill in the art to modify the teachings of Freeman et al., which rely upon focusing of light from the sources 140A and 140B into the center of the fluid chamber, to produce the claimed uniform irradiation of the flowing fluid is misplaced.

Carter et al. pertain to increased uniformity of irradiation of both near and far surfaces of work pieces as set forth in Column 5, lines 51-67 and elsewhere. As may be seen, either a moving ribbon 15 as illustrated, for example, in Fig. 4 or a continuous filament at 30' as illustrated in Fig. 9, are treated to provide a uniform surface irradiation. However, a person of ordinary skill in the art would not consider

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a teaching of uniform surface radiation "to provide a substantially uniform irradiation within the fluid in said fluid passageway" as recited in claim 1. Clearly, the consideration of achieving uniform surface irradiation for surface curing purposes is fundamentally different than the substantially uniform irradiation of a flowing fluid inside of a conduit to achieve uniform irradiation therein, which is subject to the problems described in the specification.

While the teaching of Carter et al. is to move the irradiation source 21 away from a focal point to achieve the objective of uniformly irradiating the surface of the work piece being treated, such teaching is not analogous art. A person of ordinary skill in the art would not be motivated to modify the focusing of irradiation into a fluid flowing through a passageway as taught by Freeman et al. to not focus the irradiation such that a substantially uniform irradiation distribution within the fluid in the fluid passageway is achieved as recited in claim 1 such that there are not substantially different degrees of irradiation being imaged upon the flowing fluid depending upon the position of the flowing within the passageway.

The dependent claims define further aspects of the present invention which are not rendered obvious by the proposed combination of Freeman et al. and Carter.

Claims 5-10 stand rejected under 35 USC §103 as being unpatentable Freeman and Carter in view of U.S. Patent No. 5,136,491 (Kano) further in view of U.S. Patent No. 6,083,387 (LeBlanc). The teachings of Kano and LeBlanc do not cure the deficiencies noted above with respect to the combination of Freeman et al. and Carter.

Claims 23-26, 30-34, 36-39, 43-68, 71 and 72 stand rejected under 35 USC §103 as being unpatentable over Freeman and Carter and Kano and LeBlanc. These grounds of rejection are traversed for the following reasons. The teachings of

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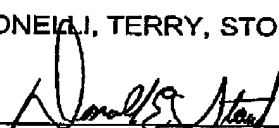
Kano and LeBlanc do not cure the deficiencies noted above with respect to Freeman and Carter.

In view of the foregoing remarks, it is submitted that each of the claims in the application is in condition for allowance. Accordingly, early allowance thereof is respectfully requested.

If the Examiner believes that there are any matters which can be resolved by way of either a personal or telephone interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

Applicants request any shortage or excess in fees in connection with the filing of this paper, including extension of time fees, and for which no other form of payment is offered, be charged or credited to Deposit Account No. 01-2135 (Case: 866.40842PX1).

Respectfully submitted,
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